

6.4.2 Measure the reuse of water across the university

At Alexandria University, Water and Wastewater Treatment are central to improving Water Quality, protecting Water Resources, and ensuring a reliable Water Supply for Drinking Water, Irrigation, and research Areas across the campuses. This Study analyzes Waste Water, Groundwater, and treated Effluent using Methods such as Adsorption, Membrane filtration, Activated Sludge systems, and Desalination, evaluating the Removal of Pollutants, Heavy Metal contaminants, and changes in Concentration to enhance Sustainable Water Management and Environmental Protection within the University.

1. The *Water Recycling Program* demonstrates significant progress in non-potable water reuse and resource recovery. Treated sewage effluent (TSE) from the *Campus*, totaling approximately 1.12 million m³ annually, is utilized for landscape irrigation. At the *Faculty of Pharmacy*, a greywater pilot system treats hand-wash wastewater for toilet flushing, while air-conditioning condensate recovery systems in select buildings supply irrigation and flushing operations. Rainwater is harvested into a central retention lake, providing an additional source for green-area irrigation. The *Faculty of Agriculture's* aquaculture facility recycles nutrient-rich effluent from its eight-pond fish farm to irrigate adjacent crops, enhancing soil fertility and yield. The University also operates a 100 m³/day solar-powered desalination unit at *Wadi El-Natroun*. It has developed an innovative renewable energy-driven multi-stage flash desalination system (RE-NF-MSF) with nanofiltration pre-treatment, demonstrating leadership in sustainable water technologies.
2. In relation to *Treated Water Consumption*, Alexandria University channels the entirety of its wastewater 1,116,625.26 m³ annually, through the *Alexandria Sanitation Company* for secondary and tertiary treatment. A substantial portion of this treated water supports Egypt's *New Delta* agricultural reclamation project, thereby contributing to the country's national food security objectives. Treated water is reused for irrigation, aquaculture, and experimental research, establishing a closed-loop water management model that exemplifies the University's commitment to sustainable resource utilization.
3. The irrigated water supplied to the fish farm at the Agriculture Experimental Research Station of the Faculty of Agriculture is recycled to irrigate the crops, vegetables, and fruits of the land farm. The recycled water is rich with natural fertilizers and enhances the crops production.
4. In addition, the water recycling in Fish Aquaculture of the Faculty of Agriculture, Alexandria University: The watersewage of the Aquaculture of the Faculty of Agriculture, Alexandria University which consist of eight ponds (one acre and quarter/each) in Abis region. Alexandria University used the recycled water for crops culturing in the adjacent agriculture research center in Abis.
5. **Elements of Green Building Implementation as Reflected in all new construction and renovation policies in the new buildings in Abis campus:**
 - The area of the project is 160 acres, a general site for educational buildings, and 120 acres are complementary activities. The percentage of green areas and lake is about 52% in addition to 25% streets and lanes.
 - Water-saving plots are used, which will reduce water consumption by about 30%. The

- sewage water will be treated and reused in the irrigation of green areas in the project.
 - Wastewater will be treated and reused to irrigate green areas in the project.
 - Rainwater is collected in the main lake and used for irrigation.
 - The use of plants with few water rationed plants to reduce irrigation needs in addition to absorbing quantities of rainwater to reduce the severity of rain spells.
6. An amount of water of 967,694.74 is consumed by all faculties and institutes affiliated with the Alexandria University, of which the amount of sewage is 870,925,266 m³, which is lifted through a group of lifting stations to be treated through treatment stations affiliated with the Alexandria Sanitation Company.
- Secondary biological treatment, where solid waste is separated from liquid waste.
 - Treated water: As for the water resulting from first treatment, it is reused within the New Delta Project (the value of the reused water for Alexandria University represents 870,925.266 m³).
 - The Tertiary treatment for use in land reclamation with a design capacity of 7.3 million m³, include 1.7 million cubic meters of treated wastewater form the secondary treatment.



The water sewage of the Aquaculture of the Faculty of Agriculture (Alexandria University, Egypt)
The irrigated water supplied to the fish farm at the Agriculture Experimental Research Station of the Faculty of Agriculture is recycled to irrigate the crops, vegetables, and fruits of the land farm.



Wastewater treatment unit at Faculty of Engineering

Rooftop Cultivation



Grey water recycling system organized by Faculty of Pharmacy (Alexandria University, Egypt), and reused in rooftop cultivation.



Air conditioning water collection and reuse unit - Faculty of Engineering



The sewage water will be treated and reused in the irrigation of green areas in the project (Alexandria University)

